REMARKS

Claims 1-40 are pending in the subject application. Claims 19-39 were withdrawn subject to a restriction requirement. Applicant has amended claims 1 and 40 in order more particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has deleted claim 2. Applicant has not added any claims. Accordingly, claims 1, 3-18 and 40 are presently being examined.

In view of the following Amendment and Response, applicant respectfully requests that the Examiner reconsider and withdraw the rejections made in the outstanding Office Action.

Support for the Amendments

Applicant has amended claim 1 in order more particularly point out and distinctly claim the subject matter of applicants' article having a catalyst composite with a close coupled upstream section and a downstream section and method of forming same. Specifically, applicant has canceled claim 2 and incorporated the subject matter into independent claims 1 and 40 to recite that "the first and second supports are independently selected from the group consisting of alumina, titania, and zirconia compounds". Applicants have entered these amendments in order to overcome the Examiner's rejections.

These amendments to the claims are fully supported in the specification as originally filed, and thus no new matter is introduced by these amendments in accord with 35 U.S.C. Section 132. Accordingly, applicants request entry of these amendments.

Election/Restrictions

The Examiner has acknowledged applicant's election with traverse of Groups I and III on the ground(s) that the Examiner provides no support for the finding that the product of Group I is not allowable. The Examiner contends that this is not persuasive because the finding that the product of Group I is not allowable is supported via the rejections set forth in the previous Office Action. The Examiner argues that since the claims are directed to three inventions: the product (Group I), the process (Group II) of using the product, and the process (Group III) of making the product and since the product of Group I is not allowable as evidenced by the rejections set forth in the previous Office Action, restriction is proper between the method of making the product and method of using the product. The Examiner concludes that the requirement is still deemed proper and is therefore made final.

Rejection of Claim 18 under 35 U.S.C. Section 112, second paragraph.

Applicants acknowledge with appreciation that the Examiner has withdrawn the rejection of claim 18 under 35 U.S.C. Section 112, second paragraph, in view of applicants' amendment to claim 18.

Rejection of Claims 1-18 and 40 under 35 U.S.C. Section 102(b) as being anticipated by *Strehlau et al.*

The Examiner has rejected claims 1-18 and 40 under 35 U.S.C. Section 102(b) as being anticipated by CA 2,267,010 (*Strehlau et al.*). With respect to claims 1-3, 8-16, 18, and 40, the Examiner states that *Strehlau et al.* discloses an apparatus and a

method of making the apparatus, comprising a lean burn engine 2 having an exhaust outlet; an upstream section 5 having a close coupled catalyst composite in communication with the exhaust outlet, the upstream close coupled catalyst composite comprising a first support; a first platinum group component; and a SOx sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, strontium, etc.; and a downstream section 6 comprising a second support; a second platinum group component; and a NOx sorbent component selected from the group consisting of compounds of lithium, sodium, potassium, cesium, calcium, strontium, barium, lanthanum, etc. The Examiner further states that *Strehlau et al.* discloses that the upstream section has substantially no components adversely affecting three-way conversion under operating conditions. The Examiner further states that *Strehlau et al.* discloses that the first and second supports may be ceramic (cordierite) or metal honeycomb substrates. With respect to claims 4-7, the Examiner states that *Strehlau et al.* discloses that the first and second platinum group metal components are platinum, palladium, rhodium, ruthenium, iridium, osmium. With respect to claim 17, the Examiner states that *Strehlau et al.* discloses that the upstream and/or downstream section further comprises a zirconium component. The Examiner argues that instant claims 1-18 and 40 structurally read on the apparatus of *Strehlau et al.* Applicants' claims as amended obviate the Examiner's rejections.

As set out above, applicant has canceled claim 2 and incorporated the subject matter into independent claims 1 and 40 to recite that "the first and second supports are independently selected from the group consisting of alumina, titania, and zirconia compounds". In summary, *Strehlau et al.* does not disclose applicants' article having a catalyst composite with a close coupled upstream section and a downstream section, with applicants' the first and second supports. Applicants' close-coupled catalyst is placed close to an engine to enable it to reach reaction temperatures as soon as possible.

However, during steady state operation of the engine, the proximity of the close-coupled catalyst to the engine, typically less than one foot, more typically less than six inches and commonly attached directly to the outlet of the exhaust manifold exposes the close-coupled catalyst composition to exhaust gases at very high temperatures of up to 1100°C. The close-coupled catalyst in the catalyst bed is heated to high temperature by heat from both the hot exhaust gas and by heat generated by the combustion of hydrocarbons and carbon monoxide present in the exhaust gas. In addition to being very reactive at low temperatures, the close-coupled catalyst composition should be stable at high temperatures during the operating life of the engine. (applicants' specification at page 10, lines 25-35).

Applicants invention, as set out in amended claim 1, provides an article comprising: (A) a lean burn gasoline engine having an exhaust outlet; (B) an upstream section having a close coupled catalyst composite in communication with the exhaust outlet, the upstream close coupled catalyst composite comprising: (i) a first support; (ii) a first platinum group component; and (iii) a SO_X sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, manganese, neodymium, praeseodymium, and strontium; and (C) a downstream section comprising: (i) a second support; (ii) a second platinum group component; and (iii) a NO_X sorbent component. The upstream section has substantially no components adversely affecting three-way conversion under operating conditions. The first and second supports are independently selected from the group consisting of alumina, titania, and zirconia compounds.

Applicants invention, as set out in amended claim 40, provides a method of forming a catalyst composite having a close coupled upstream section and a downstream section. The method comprises the steps of: (a) forming a close coupled upstream section comprising: (i) a first support; (ii) a first platinum group component;

and (iii) a SO_X sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, manganese, neodymium, praeseodymium, and strontium; and (b) forming a downstream section comprising: (i) a second support; (ii) a second platinum group component; and (iii) a NO_X sorbent component. The upstream section has substantially no components adversely affecting three-way conversion under operating conditions. The first and second supports are independently selected from the group consisting of alumina, titania, and zirconia compounds.

The close-coupled catalyst of the present invention has been designed to reduce hydrocarbon emissions from gasoline engines during cold starts in the presence of sulfur oxide contaminants. More particularly, the close-coupled catalyst is designed to reduce pollutants in automotive engine exhaust gas streams at temperatures as low as 350°C, preferably as low as 300°C and more preferably as low as 200°C. The close-coupled catalyst of the present invention comprises a close-coupled catalyst composition which catalyzes low temperature reactions. This is indicated by the light-off temperature. The light-off temperature for a specific component is the temperature at which 50% of that component reacts. The catalyst composites of the present invention have an upstream section having a SO_X sorbing close coupled catalyst composite in communication with an exhaust outlet and a NO_X sorbing downstream section. The upstream section has substantially no components adversely affecting three-way conversion under operating conditions. The SO_X sorbent component in the upstream close coupled catalyst composite is selected such that release of SO_X occurs only under rich conditions where the SO_X cannot be retrapped in the downstream NO_X sorbing component. (applicants' specification at page 10, lines 8-23).

The present invention includes an article comprising a gasoline engine having an exhaust outlet, typically connected in communication to the inlet of an exhaust

manifold. The close-coupled catalyst is in communication with the exhaust outlet and is typically connected in communication with the exhaust manifold outlet. The close-coupled catalyst can be connected directly to the gasoline engine outlet or exhaust manifold outlet. Alternatively, it can be connected by a short exhaust pipe, typically up to about one foot long to the exhaust outlet or exhaust manifold outlet of the gasoline engine. The close-coupled catalyst has an outlet which is connected in communication with the inlet of the downstream preferably underfloor catalytic converter. Exhaust pipes can be connected from the outlet of the close-coupled catalyst outlet and the inlet of the underfloor catalytic converter inlet. The underfloor catalytic converter has an outlet which can be connected to outlet exhaust pipes through which the exhaust gas passes from the vehicle into the atmosphere. The close-coupled catalyst comprises a close-coupled catalyst composition. The underfloor catalyst preferably comprises a NOx trap containing ceria. (applicants' specification at page 11, lines 22-36).

The *Strehlau et al.* reference discloses a process for operating an exhaust-gas treatment unit for an internal-combustion engine which is operated during most of the operating period with lean air/fuel ratios. The exhaust-gas treatment unit includes:

a nitrogen-oxides storage catalyst with an activity window *delta*T_{NOX} between the temperatures $TK_{,1}$ and $TK_{,2}$ for the storage of nitrogen oxides at normalized air/fuel ratios greater than 1 and release of the nitrogen oxides at normalized air/fuel ratios less than or equal to 1 and a sulfur-desorption temperature $T_{S,DeSox}$ above which sulfates stored on the catalyst are decomposed at normalized air/fuel ratios less than or equal to 1; and

a sulfur trap, which is upstream of the nitrogen-oxides storage catalyst and located at a distance there from, with a sulfur-desorption temperature $T_{S,DeSox}$ above which

sulfates stored on the sulfur trap are decomposed at normalized air/fuel ratios less than or equal to 1.

Strehlau et al. states that there is a temperature difference *delta*$T_{S,K}$ between the sulfur trap and the storage catalyst, which is the difference between the exhaust gas temperature Ts measured just upstream of the sulfur trap and the exhaust gas temperature T_K measured just upstream of the storage catalyst.

The *Strehlau et al.* process includes the steps of:

(a) storage of the nitrogen oxides contained in the exhaust gas on the nitrogen-oxides storage catalyst and of the sulfur oxides on the sulfur trap at normalized air/fuel ratios greater than 1 and with exhaust gas temperatures T_E within the activity window *delta*T_{NOx}, wherein at the same time the exhaust gas temperature T_S is less than the sulfur desorption temperature $T_{S,DeSOx}$, and cyclic lowering of the normalized air/fuel ratio in the exhaust gas to less than 1 to release the stored nitrogen oxides;

(b) removal of sulfur from the sulfur trap after each predetermined number N_1 of nitrogen-oxides storage cycles by raising the exhaust gas temperature T_S above the sulfur desorption temperature $T_{S,DeSOx}$ of the sulfur trap and lowering the normalized air/fuel ratio in the exhaust gas to below 1: and

(c) cyclic repetition of steps (a) and (b).

Moreover, *Strehlau et al.* does not disclose applicants' first and second supports independently selected from the group consisting of alumina, titania, and zirconia compounds.. Accordingly, the Examiner's rejection of claims 1-18 and 40 under 35 U.S.C. Section 102(b) as being anticipated by *Strehlau et al.* should be withdrawn.

Rejection of Claims 1-18 and 40 under 35 U.S.C. Section 103(a) as being unpatentable over *Strehlau et al.* in view of *Toyota*.

The Examiner has rejected claims 1-18 and 40 under 35 U.S.C. Section 103(a) as being unpatentable over *Strehlau et al.* in view of EP 625,633 (*Toyota*). The Examiner states that *Strehlau et al* is silent as to the specific support for the storage catalyst 6, however, *Strehlau et al.* further discloses the conventionality of providing a specific support of catalyst and SOx sorbent. The Examiner argues that *Toyota* discloses the conventionality of providing a NOx sorbent with the specific support as claimed. The Examiner concludes that it would have been obvious to use the conventional support as disclosed in *Strehlau et al.* or *Toyota* for supporting the NOx sorbent in the apparatus and method of *Strehlau et al.*, if not inherent therein, on the basis of its suitability for the intended use as a matter of obvious design choice, as use of such is conventional in the art and no cause for patentability here as evidenced by *Strehlau et al.* and *Toyota*. Applicants traverse the Examiner rejections.

The *Toyota* reference discloses an exhaust purification device of an internal combustion engine provided with an exhaust passage, an NOx absorbent, an SOx absorbent, and an air-fuel ratio control means. The NOx absorbent is arranged in the exhaust passage to absorb the NOx when the air-fuel ratio of an inflowing exhaust gas is lean and, at the same time, to release the absorbed NOx when an oxygen concentration in the inflowing exhaust gas is lowered. The SOx absorbent is arranged in the exhaust passage on the upstream side of the NOx absorbent to absorb the SOx when the air-fuel ratio of the inflowing exhaust gas is lean and, at the same time, to release the absorbed SOx when the air-fuel ratio of the in-flowing exhaust gas is made rich. The air-fuel ratio control means controls the air-fuel ratio of the exhaust gas flowing into the SOx absorbent, and maintains the air-fuel ratio of the exhaust gas

flowing into the SOx absorbent lean, and makes the air-fuel ratio of the exhaust gas flowing into the SOx absorbent rich, when the SOx should be released from the SOx absorbent.

As set out above, applicant has canceled claim 2 and incorporated the subject matter into independent claims 1 and 40 to recite that "the first and second supports are independently selected from the group consisting of alumina, titania, and zirconia compounds". In summary, *Strehlau et al.* does not disclose applicants' article having a catalyst composite with a close coupled upstream section and a downstream section, with applicants' the first and second supports. Since the primary reference of *Strehlau et al.* does not disclose applicant's invention, the combination of the primary reference of *Strehlau et al.* and the secondary reference of *Toyota* similarly does not disclose applicant's article having a catalyst composite with a close coupled upstream section and a downstream section. Accordingly, the Examiner's rejection of claims 1-18 and 40 under 35 U.S.C. Section 103(a) as being unpatentable over *Strehlau et al.* in view of *Toyota* should be withdrawn..

Obviousness of a composition or process must be predicated on something more than it would be obvious "to try" the particular component recited in the claims or the possibility it will be considered in the future, having been neglected in the past. *Ex parte Argabright et al.* (POBA 1967) 161 U.S.P.Q. 703. There is usually an element of "obvious to try" in any research endeavor, since such research is not undertaken with complete blindness but with some semblance of a chance of success. "Obvious to try" is not a valid test of patentability. *In re Mercier* (CCPA 1975) 515 F2d 1161, 185 U.S.P.Q. 774; *Hybritech Inc. v. Monoclonal Antibodies. Inc.* (CAFC 1986) 802 F2d 1367, 231 U.S.P.Q. 81; *Ex parte Old* (BPAI 1985) 229 U.S.P.Q. 196; *In re Geiger* (CAFC 1987) 815 F2d 686, 2 U.S.P.Q.2d 1276. *In re Dow Chemical Co.* (CAFC 1988) F2d, 5 U.S.P.Q.2d 1529. Patentability determinations based on that

as a test are contrary to statute. *In re Antonie* (CCPA 1977) 559 F2d 618, 195 U.S.P.Q. 6; *In re Goodwin et al.* (CCPA 1978) 576 F2d 375, 198 U.S.P.Q. 1; *In re Tomlinson et al.* (CCPA 1966) 363 F2d 928, 150 U.S.P.Q. 623. A rejection based on the opinion of the Examiner that it would be "obvious to try the chemical used in the claimed process which imparted novelty to the process does not meet the requirement of the statute (35 U.S.C. 103) that the issue of obviousness be based on the subject matter as a whole. *In re Dien* (CCPA 1967) 371 F2d 886, 152 U.S.P.Q. 550; *In re Wiaains* (CCPA 1968) 397 F2d 356, 158 U.S.P.Q. 199; *In re Yates* (CCPA 1981) 663 F2d 1054, 211 U.S.P.Q. 1149. Arguing that mere routine experimentation was involved overlooks the second sentence of 35 USC 103. *In re Saether* (CCPA 1974) 492 F2d 849,181 U.S.P.Q. 36. The issue is whether the experimentation is within the teachings of the prior art. *In re Waymouth et al.* (CCPA 1974) 499 F2d 1273, 182 U.S.P.Q. 290. The fact that the prior art does not lead one skilled in the art to expect the process used to produce the claimed product would fail does not establish obviousness. *In re Dow Chem. Co.* (CAFC 1988) 5 U.S.P.Q.2d 1529.

The provisions of Section 103 must be followed realistically to develop the factual background against which the Section 103 determination must be made. It is not proper within the framework of Section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary for the full appreciation of what such reference fairly suggest to one of ordinary skill in the art. The references of record fail to teach or suggest appellant's invention as a whole.

In view of the foregoing Amendment and Response, applicants request reconsideration pursuant to 37 C.F.R. Section 112 and allowance of the claims pending in this application. Applicant requests the Examiner to telephone the undersigned attorney should the Examiner have any questions or comments which might be most

expeditiously handled by a telephone conference. No fee is deemed necessary in connection with the filing of this Amendment and Response. If any fee is required, however, authorization is hereby given to charge the amount of such fee to Deposit Account No. 18-1843.

Respectfully submitted,

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